

UNIVERSITY OF CALIFORNIA, SANTA BARBARA

L-77 REACTOR

ANNUAL REPORT OF OPERATIONS

January 1, 1979 through December 31, 1979

License R-124  
Docket No. 50-433

A.E. Profio  
Reactor Director

Operating Experience, Changes and Tests

This is the fifth annual report for the 10-watt, L-77 training reactor at the University of California, Santa Barbara. The reactor is operated mainly for instruction in nuclear engineering, but also for some neutron activation analysis and other irradiations.

The reactor is the principal facility for the NE125 Neutronics Laboratory course, required for all B.S. degree majors in nuclear engineering. Experiments include power calibration and flux plotting, control rod reactivity calibrations by subcritical multiplication and supercritical period methods, reactivity-worth (importance) of absorbing and scattering samples as a function of position in the core, and neutron activation analysis. Students operate the reactor under the supervision of a licensed operator. The laboratory course is offered two afternoons a week (two sections) in the spring quarter.

In early 1979, the reactor was operated for training and one trainee, Dr. Gad Shani, subsequently took and passed the operator license examination and is currently licensed.

Irradiations were performed on samples for activation analysis in the lab course, and also of a small sample of lithium (encapsulated in aluminum) for generation of tritium as part of an investigation of fusion reactor blankets under a grant from the National Science Foundation (A.E. Profio).

Lucite rods were added to the auxiliary ports in order to increase the excess reactivity to the 0.5%  $\Delta k/k$  permitted by the licence, allowing more absorbing samples to be irradiated.

A wall was built between the reactor area and the physics area, and the east exit installed. A power-failure indicator was added to the console.

The annual power calibration was performed on 7-6-79. Control rod drive speeds and rod worths were completed 7-6-79, and control rod drive mechanisms inspected 8-1-79. Radiation and air monitors were calibrated 8-1-79. Seismic accelerometer calibration was done 7-27-79. Tank and console maintenance were performed 7-26-79. The rod drop time tests were performed 6-4-79. The core-recombiner pressure gage calibration and scram test was carried out 7-26-79, as well as the shield water level scram test. The flux instrumentation was calibrated and serviced on 7-3-79. The radiation level and contamination survey was carried out by EH&S on 1-11-79 and 9-10-79. All tests were passed.

#### Unscheduled Shutdowns and Scrams

3-1-79: Scram on incorrect range-switching.  
4-23-79: Spurious period scram from electrical transient.  
5-14-79: Spurious period scram from electrical transient.  
6-6-79: Scram on incorrect range-switching.

#### Preventive and Corrective Maintenance Operations

Routine preventive and corrective maintenance was performed according to the Operations Manual. Notable events:  
1-21-79: Air monitor did not alarm, two transistors replaced.  
3-15-79: False alarm on air monitor, set point too low.

12-18-79: False radiation alarm, traced to poor connection of transistor in socket.

Changes Under 10 CFR 50.59

None.

Radioactive Effluents Discharged

Liquid wastes: none from reactor

Solid wastes: Very low level contaminated gloves and similar items, disposed of off-site by Environmental Health and Safety.

Gaseous wastes: Not discharged during operation as the core-recombiner vessel is sealed. However, the core-recombiner vacuum (pressure) gage and loss-of-vacuum alarm are tested semiannually by admitting air, then reevacuating into a tank for holdup and decay for six months. Short-lived gaseous activities decay between tests, but a small amount of 10.4-yr krypton-85 is discharged to the atmosphere when the holdup tank is evacuated. Calculations based on watt-hours of operation, and yield of Kr-85, conservatively neglecting decay, give:

1.5 microcuries discharged 7-26-79.

This small activity is discharged on the roof after mixing with reactor room ventilation air and presents no hazard.

Environmental Surveys Done Outside Facility: none

Significant Radiation Exposures: none

Energy Output in 1979: 16.9 watt-hours

Hours Critical in 1979: 15.7

Energy Output Since Initial Criticality: 282.6 W-h or 11.8 W-d.